Remarks

Reconsideration is requested in view of the preceding amendments and the following remarks. Upon entry of this Amendment, claims 1-38 are in the application.

By this Amendment, new claim 38 is submitted for consideration. Support for new claim 38 can be found throughout the specification and at, for example, claims 1 and 11. No new matter is introduced.

Rejections under 35 U.S.C. § 102 in View of Felix

Claims 1-10 stand rejected as allegedly anticipated by FELIX TUTORIALS (hereinafter Felix). This rejection is traversed.

Claim 1 recites a method comprising forming a model of multi-dimensional spectroscopic information including at least one set of two or more mutually exclusive terms. The set of terms is formed from at least first and second multi-dimensional spectroscopic data sets of a dimension less than the modeled multi-dimensional information. Only one of the set of mutually exclusive terms is selected to represent the multi-dimensional spectroscopic information by fitting the model to a third multi-dimensional spectroscopic data set.

Felix does not teach or suggest such a method. Felix teaches conventional processing of 1D, 2D, or 3D data. For example, Felix teaches peak finding, measuring peak heights, and evaluating signal to noise ratio for peak highs. See Felix at 19. Felix is also discussed in the subject application:

> Following action 110, action 120 calls for an analysis of the obtained 2D projections to determine significant features of the projections. In an NMR data set, these features relate to the spectral peaks and include the peak frequencies and linewidths of those peaks in the 2D projections. These features are acquired through data analysis of the 2D projections with a lineshape fitting routine useful for extracting peak frequencies and linewidths. Any of various peak picking

> routines can be used for this purpose, including for example, the Felix 2D Module software by Accelrys, Inc. of 300 Lanidex Plaza, Parsippany, N.J. 07054. Page 7, first full paragraph.

Felix does not teach or suggest forming a model of multi-dimensional data including at least one set of mutually exclusive terms. Felix merely finds peaks and other features in multidimensional data, and does not teach or suggest any sets of mutually exclusive terms, or selecting one of the mutually exclusive terms based on fitting the model to a third multi-dimensional data set. For at least this reason, claim 1 and dependent claims 2-10 are properly allowable over Felix.

Dependent claims 2-10 are allowable for additional reasons as well. For example, claim 2 further recites that the first and second data sets share a common dimension and the second data set has at least one dimension orthogonal to a dimension in the first data set. Felix does not teach or suggest a second data dimension that is orthogonal to a dimension in the first data set or a common data dimension. The Office Action states that "orthogonality is a property of Fourier theory," referring to the mention of Fourier transforms in Felix at page 47. However, the orthogonality of Fourier theory is orthogonality of functions, not orthogonality of dimensions as recited. For at least this reason, claim 2 and dependent claim 3 are properly allowable over Felix.

In addition, claim 9 is apparently noted as corresponding to Felix as modified by an obvious design choice. Felix does not teach or suggest all the features of claim 9 and its base claim, and claim 9 is properly allowable. In addition, if any modification of Felix is used to reject claim 9, the rejection cannot be under 35 U.S.C. § 102. Clarification is requested.

Rejections under 35 U.S.C. § 102 in View of Dunkel

Claims 11-34 and 37 stand rejected as anticipated by Dunkel, U.S. Patent 5,572,125 ("Dunkel"). This rejection is traversed.

Claim 11 recites, in part, a method of analyzing a physical object that comprises forming at least first and second multi-dimensional data sets of a response of the object to a series of stimuli, and forming a model of multi-dimensional information of a dimension higher than the dimension of the first or second data sets. The model includes at least one set of terms where each term in the set represents a potential correlation between features of the first and second data sets. A term in the set is determined as representing the actual correlation between features of the first and second data sets by comparing the model to a third multi-dimensional data set. Dunkel does not teach or suggest such a method. In particular, Dunkel does not teach or suggest a set of terms in which each term represents a potential correlation between features of first and second data sets, or selecting a term as representing an actual correlation. The Office Action cites Dunkel at col. 27, lines 25-30 as teaching a model that includes at least one set of terms wherein each term represents an actual correlation:

> The width of the spectrum in FIG. 15 was taken as wide as necessary to avoid aliasing of dispersive signal tails. The spectrum was decomposed as described before and one fifth of signal intensities at both ends of the spectrum were set to zero to decrease the correlation between baseline and phase parameters.

This portion of Dunkel does not teach or suggest a set of terms representing potential correlations between a first data set and a second data set, nor selection of one of the set of terms as representing an actual correlation. Instead, Dunkel teaches that a single NMR spectrum (shown in Dunkel's Fig. 15) having phase and baseline distortion can be corrected for phase and baseline distortions (as shown in Dunkel's Fig. 16).

Dunkel is also cited as teaching forming a model of multi-dimensional information of a dimension higher than the dimension of a first or second data set. According to the cited portion of Dunkel:

> Multidimensional experimental spectral or imaging data can be automatically analyzed or can be automatically corrected for various data distortions using the invention. In both aspects of the invention, a mathematical model defining the expected experimental spectral or imaging data is selected or determined. The model includes various parameters to be adjusted to best fit the data. Initial estimates of the parameters are made, and such estimates of the parameters are inserted into the mathematical model of the expected spectral or imaging data. Regression analysis is performed using the mathematical model with appropriate estimated parameters during which such estimated parameters are adjusted so that the values of the parameters providing the best-fit of the mathematical model to the actual data are obtained. The adjusted parameters obtained through this regression analysis may be used to correct the data and provide corrected data to be analyzed in traditional manner by a spectroscopist, or the adjusted parameters may be used directly to provide the desired information regarding the data. This is referred to as automatically analyzing the data. Col. 7, lines 35-55.

This portion of Dunkel refers to data fitting and regression analysis but is silent concerning forming a model of multi-dimensional information of a dimension higher than that of a first data set and a second data set.

For at least these reasons, claim 11 and dependent claims 12-17 and 37 are properly allowable over Dunkel.

Claim 18 recites a device comprising, in part, a computer readable media containing programming instructions for a multidimensional interrogation device. The instructions are operable to cause the multidimensional interrogation device to form a model of multi-dimensional interrogation information including at least one set of terms where each term represents a potential correlation between features of at least first and second multi-dimensional data sets, the first and second data sets of a dimension less than the modeled information, and to determine which term represents the actual correlation between features of the first and second

data sets by comparing the model to a third multi-dimensional data set. Dunkel does not teach or suggest such a device. For example, Dunkel does not teach or suggest a model of multi-dimensional interrogation information including at least one set of terms where each term represents a potential correlation between features of at least first and second multi-dimensional data sets, nor determining which term represents the actual correlation between features of the first and second data sets by comparing the model to a third multi-dimensional data set. For at least these reasons, claim 18 and dependent claims 19-23 are properly allowable over Dunkel.

Claim 24 recites a method comprising forming at least one set of terms from at least first and second multi-dimensional spectroscopic data sets wherein each of the terms in the set is representative of potential correlations between features in the first and second data sets, determining which of the set of terms represents the actual correlation between features of the multi-dimensional data sets by comparing the model to a third multi-dimensional spectroscopic data set, and representing multi-dimensional spectroscopic information with the determined term. Dunkel does not teach or suggest such a method. For example, the cited portions of Dunkel do not teach or suggest forming at least one set of terms from first and second multi-dimensional spectroscopic data sets wherein each of the terms in the set is representative of potential correlations between features in the first and second data sets, nor determining which of the set of terms represents the actual correlation between features of the multi-dimensional data sets. For example, the Office action cites Dunkel, col. 37, lines 30-49:

> 1. A method for correcting spectral data comprising
> a) providing a digital computing device having memory;
> b) obtaining spectral data to be corrected, said obtained spectral data including at least one signal in said obtained spectral data, and placing at least a portion of said obtained spectral data in the memory;
> c) selecting a predetermined mathematical model of expected spectral data;
> d) automatically estimating preselected model parameters of at least one signal in the obtained spectral data;

> e) adjusting the estimates of preselected parameters through regression analysis with said mathematical model to obtain adjusted estimates of the preselected parameters representing a fit of said mathematical model to the at least a portion of said obtained spectral data in memory; and
> f) determining corrected data using the adjusted estimates of at least one of the preselected parameters.

The cited portion of Dunkel merely teach fitting a mathematical model to spectral data, but does not teach or suggest a set of terms representative of potential correlations between features in first and second data sets, or determining which term of the set of terms represents an actual correlation. Accordingly, claim 24 and dependent claims 25-29 are properly allowable over Dunkel.

Claim 30 recites an apparatus comprising a device carrying logic to form a model of multi-dimensional information wherein the model includes at least one set of terms where each term represents a potential correlation between features in at least first and second multi-dimensional data sets of a dimension less than the modeled information, and selecting one of the set of terms for representing the multi-dimensional information by comparing the model to a third multi-dimensional data set. Dunkel is cited as teaching such an apparatus at col. 14, lines 8-41:

> For one-dimensional spectra such a predetermination can be done from a power or magnitude spectrum. Besides approximate transition frequencies of possible lines, rough estimates of other characteristic parameters such as intensities and linewidths can also be determined. The accuracy of obtained values is limited by signal distortions caused by signal overlap and phase parameters cannot be obtained from phase insensitive power or magnitude spectra. In addition to the techniques used for one-dimensional spectra, possible signal regions in multi-dimensional spectra can be derived from related one-dimensional spectra or from various projections of the multi-dimensional data.
>
> The initial comparison of a phase sensitive spectrum and the lineshape model will show strong deviations due to inaccurately determined lineshape parameters and the unknown spectral phase. These deviations, measured as the sum-of-squared

> residuals, can be decreased by either adjusting the phase of the spectrum to fit the model or by adjusting model parameters to fit the data. In contrast to prior art, which iteratively improves the phase of a single resonance by changing the spectrum to optimize a predefined criterion, it is preferable, with the present invention, to keep the data unchanged while all data distortions such as the phase are included in the model and adjusted with the other parameters to best describe the spectral region.
>
> This approach makes the well-developed methods of regression analysis applicable to spectral correction and automated data analysis. An error analysis for every parameter allows the assessment of the goodness-of-fit, proper weighing of determined values, determination of parameter correlations, and in relationship with the parameters the distinction (and distinction probabilities) between signals and noise.

This portion of Dunkel does not teach or suggest a forming a model that includes at least one set of terms where each term represents a potential correlation between features in at least first and second multi-dimensional data sets of a dimension less than the modeled information, or selecting one of the set of terms for representing the multi-dimensional information by comparing the model to a third multi-dimensional data set. Accordingly, claim 30 and dependent claims 31-32 are properly allowable.

Claim 33 recites a method for determining multi-dimensional information concerning an object. The method comprises forming first and second multi-dimensional data sets representing projections of information concerning an object of a dimension one higher than the first and second data sets; correlating the first and second data sets to form a model of the multidimensional information concerning the object, the model including at least one set of terms where each term in the set represents a potential correlation between features in the first and second data sets; and determining which of the terms represents the actual correlation of features in the first and second data sets by comparing the model to a third multi-dimensional data set representing information concerning the object. Dunkel does not teach or suggest such a

method. For example, Dunkel does not teach or suggest a set of terms where each term represents a potential correlation between features in a first and second data set, and determining which term of the set represents an actual correlation. For at least this reason, claim 33 and dependent claims 34-36 are properly allowable.

New Claim 38

New claim 38 recites obtaining first and second multi-dimensional spectroscopic data sets having a predetermined dimension, identifying a set of two or more mutually exclusive terms based on the first and second data sets, and selecting only one of the set of mutually exclusive terms to represent the multi-dimensional spectroscopic information based on fitting to a third multi-dimensional spectroscopic data set. No combination of Felix and Dunkel teaches or suggests such a method. For example, no combination teaches or suggests selecting one of a set of mutually exclusive terms based on fitting to a third data set as claimed. For at least this reason, claim 38 is properly allowable.

Rejections under 35 U.S.C. § 103 in View of Felix and Anderson

Claims 34-35 stand rejected as allegedly obvious from a combination of Felix and Anderson et al., U.S. Patent 6,709,814 ("Anderson"). These claims depend from allowable claim 33 and are properly allowable for at least this reason.

Information Disclosure Statement (IDS)

An Information Disclosure Statement (PTO Form 1149) was submitted on September 27, 2001. A copy, taken from the USPTO Internet Portal, is attached. An initialed copy of this IDS

has not been received to indicate that the listed references have been considered. Applicant requests consideration of these references and return of an initialed PTO Form 1449.

Conclusion

In view of the preceding, all pending claims are in condition for allowance and action to such end is requested. If any issues remain, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

KLARQUIST SPARKMAN, LLP

By ______________________
Michael D. Jones
Registration No. 41,879

One World Trade Center, Suite 1600
121 S.W. Salmon Street
Portland, Oregon 97204
Telephone: (503) 595-5300
Facsimile: (503) 228-9446